Introduction:

Since the start of Virginia's Web-based Standards of Learning Technology Initiative in July, 2000 and the introduction of the Architectural Guidelines for High School Readiness, all Virginia school divisions have responded by completing one or more levels of School Readiness Certification. To date, 100% of school divisions have achieved High School Stage 1 High School Readiness Certification and approximately 90% of school divisions have completed Stage 2 High School Readiness Certification. The efforts of school divisions are in line with the Virginia General Assembly's legislative mandate that all Virginia high schools be capable of conducting online Standards of Learning testing by spring 2004.

As the Web-based Standards of Learning Technology Initiative is expanded into Virginia's middle schools, the High School Readiness Certification process has changed to reflect the addition of middle schools and eventually, Virginia's elementary schools. This new process of certification is applicable to all levels of schools and is suitably named *School Readiness Certification*. With this revised certification process, Virginia school divisions have the opportunity to complete the certification of their high schools (if still needed), complete their middle school certification, or complete their middle *and* elementary school certification simultaneously. This revised process is intended to provide school divisions with added flexibility in certifying the readiness of all of their schools.

Purpose of this Document:

This document serves as a guide to the new *School Readiness Certification* process. Specific directions are provided on completing the process and the required documentation to be submitted to the Virginia Department of Education.

School Readiness Certification Overview:

While the revised School Readiness Certification process includes certain elements of the previously required High School Readiness Certification process, significant differences in the new version include the following:

a) Combining Stage 1 and Stage 2 certifications into one document.

b) Allowing any one of the three levels of *School Readiness Certification* to be achieved by a school division in a single document.

   1) High School Certification (All high schools* are included.)

   2) Middle School Certification (All high schools* and middle schools are included.)

   3) Elementary School Certification (All high schools*, middle schools, and elementary schools are included.)

c) No longer relying on the eMeasurement Load Test software for evaluating a network's ability to sustain specific levels of concurrently administered online Standards of Learning (SOL) tests.

d) Requiring school divisions to determine and consider levels of bandwidth utilization on their existing Internet connection and WAN connections.

The School Readiness Certification document is a Microsoft Excel workbook with six individual worksheets that must be

* High schools previously certified under the "Stage 1 High School Readiness Certification Checklist" are not required at this time to re-certify under the new School Readiness Checklist. It is, however, strongly recommended that technology in previously Stage 1 Certified High Schools be updated/replaced as needed to maintain adequate technical resources for online testing and instructional purposes. All high schools (regardless of when they previously may have been certified) must be included in the new Stage 2 Test Window Calculations and Stage 2 Bandwidth Estimator worksheets to achieve current School Readiness Certification at the high school, middle school, or elementary school level.

completed for submission. The six worksheets are labeled as follows and are shown in the graphic below as they appear as separate tabs in the Excel workbook.

a) Certification Cover Page
b) Verification Page
c) Stage 1 Readiness Checklist
d) Stage 2 Test Window Calculation
e) Stage 2 Bandwidth Estimator
f) Signature Page

The information needed to complete the School Readiness Certification includes both technical and assessment details, and therefore, requires a collaborative effort from various school division personnel, likely the division's Director of testing, Director of technology, and the identified SOL Technology Initiative Project Manager.

Three conventions are used throughout the certification workbook that should assist in completing the information.

a) Cells requiring user-input are detailed in **RED** in the workbook and in this document.
b) Only cells requiring user-input are active. Using the **TAB** key in the workbook will move the cursor from cell to cell that is available for user-input.
c) Comments are available in the workbook for a number of cells. Cells with comments are identified by a small red mark in the upper right hand corner of the cell. Placing the cursor over any cell with the red mark will reveal the associated comment.

The types of information needed to complete the School Readiness Certification are detailed in the table that follows.

Information or Data Needed	Description	Location in the School Readiness Certification Document
Level of School Readiness Certification desired.	Schools are to be certified in complete groups of a) all high schools, b) all high schools and middle schools, or c) all high schools, middle schools, and elementary schools.	Certification Cover Page
Knowledge of the technology available within the group of schools being certified.	A checklist of information must be completed that addresses the minimum required technology for School Readiness Certification.	Stage 1 Readiness Checklist
School codes and school names for the group of schools being certified.	This information will need to be entered into the document for the group of schools being certified	Stage 2 Test Window Calculations Worksheet
Maximum number of computers to be used in each school to administer online testing.	The maximum number of computers in each school that are capable of **AND** will be used concurrently to administer online tests.	Stage 2 Test Window Calculations Worksheet Stage 2 Bandwidth Estimator

Information or Data Needed	Description	Location in the School Readiness Certification Document
Maximum number of tests to be administered online in each school.	This number represents a maximum TOTAL number of tests to be administered online at each school during the largest single test administration window (usually the spring administration). It is recommended that numbers from previous test administrations be used when possible to estimate this number. This data is used to calculate the proposed length of the online testing window.	Stage 2 Test Window Calculations Worksheet Stage 2 Bandwidth Estimator
Number of online test administrations to be scheduled per day.	This number represents the average number of times the computers will be used per day for an online test. Many divisions conduct 2 test administrations per day (morning and afternoon). Others have maximized their testing schedule to allow for 3 administrations per day. This data is used to calculate the proposed length of the online testing window.	Stage 2 Test Window Calculations Worksheet
Knowledge of the school division's network layout, leased bandwidth, and utilization of bandwidth.	A representation of the division's WAN and LAN connections will be needed that includes the amount of leased bandwidth provided to each school and the percent utilization of that bandwidth. This data will be used in the Bandwidth Estimator to calculate whether sufficient network resources are available for the proposed amount of division-wide, concurrent online testing to be completed.	Stage 2 Bandwidth Estimator
Signatures	The signatures of these individuals indicate agreement with the information represented in the School Readiness Certification document.	Signature Page

Certification Cover Page:

Information to be completed on this page includes the **school division number** (state assigned 3-digit code), **school division name**, and the **date of completion**. The level of School Readiness Certification is to be indicated by checking **one of three available boxes**.

Verification Page:

This page is used to indicate that the various steps of School Readiness Certification have been completed. These steps include Stage 1 School Readiness Checklist, Stage 2 Bandwidth Estimator Tool, and the collaboration and signed approval of specific individuals. **Three check boxes are available for completion**.

Stage 1 Readiness Checklist:

This checklist was previously a stand alone document that included the required elements of Stage 1 Readiness Certification and industry-standard best practices recommended by the Virginia Department of Education to be followed by all school divisions. This current checklist includes only the required elements for school divisions to achieve in order to be in compliance with the minimum requirements of the Web-based Standards of Learning Technology Initiative. School divisions **select Yes or No** for each of the 13 elements of the checklist. To be successfully certified, however, the school division must be able to answer **Yes** to all elements on the checklist. School Readiness Certification should not be submitted until all items

may be checked **Yes** for the group of schools included in the certification.

Additionally, a new version of the existing Architectural Guidelines for High School Readiness will be made available to divisions and will be titled, Architectural Guidelines for School Readiness. This revised document will reflect the minimum requirements as shown in the new Stage 1 Readiness Checklist, but it will also include updated information on industry-standard best practices for technology and recommended standards exceeding the required minimum standards.

Stage 2 Test Window Calculations:

This page of the School Readiness Certification functions as a tool for calculating the length of each school's testing window based on

a) the **maximum number of computers** to be used at the same time in each school for administering online tests,

b) the **total number of tests to be administered online** in each school during the largest test administration of the school year (usually the spring test window), and

c) the **number of test administrations** scheduled per day in each school (usually 2 or 3 per day).

The **state assigned school code** and the **school name** for each of the schools in the group being certified must be entered into the light blue section of the worksheet and then followed by the three numbers described above. The worksheet is designed to automatically calculate the length of the test window for each school based on the numbers provided. Sample data is included to demonstrate how the worksheet functions (this data should be replaced with actual entries). The formula used to calculate the length of the test window is

$$\text{Days in the Test Window} = \frac{\text{Total number of tests to be administered online}}{\text{(Maximum number of computers available) X (Number of test administrations per day)}}$$

This worksheet may be used as a tool for determining different scenarios related to the number of computers, number of tests administered, and the number of days needed to complete the testing. Only the entry submitted to the Virginia Department of Education is recorded in the worksheet.

The final data that is entered into this worksheet should match the final data that is entered into the next step of the School Readiness Certification process, or the Stage 2 Bandwidth Estimator. The two worksheets are intended to be used in conjunction with one another for determining feasible testing scenarios in each school and across the division based on available technology, available network resources, and the volume of testing to be completed.

Stage 2 Bandwidth Estimator:

Completing this worksheet requires an understanding of the school division's **WAN and LAN connections**, the **amount of leased bandwidth on these connections**, and the **percent utilization of the leased bandwidth** on the connections. Information regarding specific **schools** and **maximum numbers of concurrent online tests administered** are needed but may be obtained from (or should match) the data entered on the previous page, the Stage 2 Test Window Calculations worksheet.

The Stage 2 Bandwidth Estimator is intended to provide insight on a given network environment and its ability to deliver a specific number of Virginia SOL tests concurrently via Pearson Educational Measurement's eMeasurement application called TestNav. The worksheet is developed to analyze three potential different types of network environments. These environments are as follows:

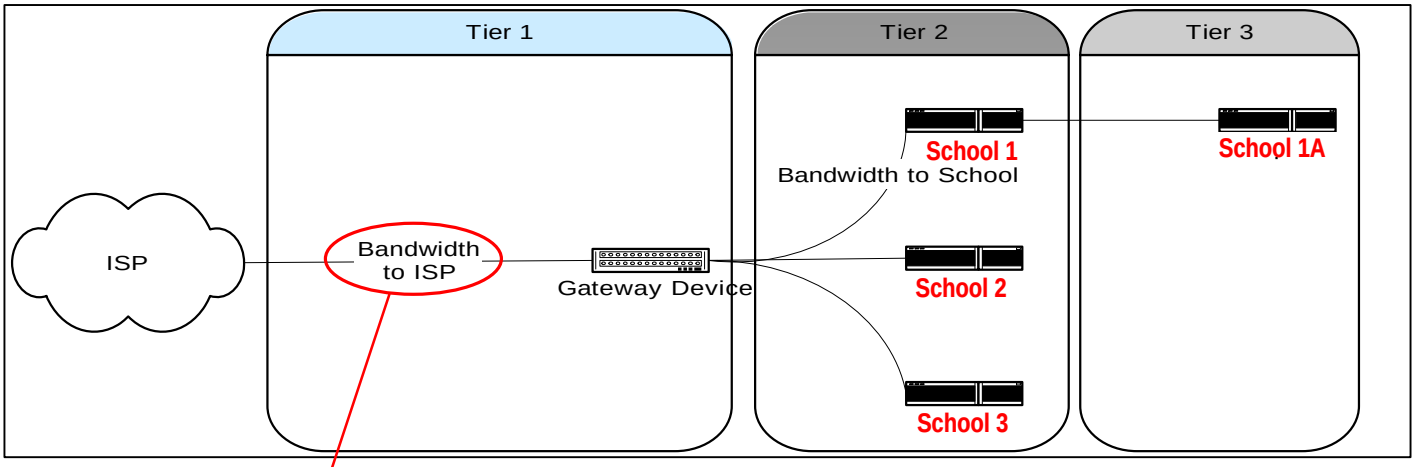
a) A single-node environment such as an individual school connected directly to an Internet Service Provider.

b) A multi-node environment where multiple schools are connected to a single location (such as a school board office building) via leased lines where a gateway to an Internet Service Provider exists.

c) A tiered environment where multiple schools that are connected to an Internet gateway located at a single location (as in option b above) provide Internet connectivity to one or more child nodes, or other schools to which it is connected. An example of this would be a middle school (the child node) connected to a high school via a leased line when the high school is in turn connected to the school board office via another leased line to connect to the Internet gateway.

A graphical representation of these options is presented on the worksheet as a reference. Data must be entered into the worksheet to provide a numerical representation of the school division's network. The data needed to complete the numerical representation are **network bandwidth**, **peak utilization of the bandwidth**, and **numbers of students concurrently testing at each location**. For easier data entry, only the cells requiring input are editable on the worksheet. By using the Tab key, the cursor will toggle only throughout these cells.

The network diagram below is from the Bandwidth Estimator worksheet. The worksheet comes pre-populated with sample data that represents **School 1** and **School 1A** as shown in this diagram. The first cell of the worksheet needing to be completed is in Section A as also shown below in the screen shot from the Bandwidth Estimator worksheet. The **amount of bandwidth to the Internet Service Provider** (ISP) is entered here. In this sample data, a T-1 line (1.543 Mbps or 1543 kbps) is the value of the leased line to the ISP.



Section A - Gateway to ISP

Leased Bandwidth to ISP	Peak Utilization of Connection to ISP (%)	Peak Utilization of Connection to ISP (kbps)	Effective Available Bandwidth (kbps)	Bandwidth Required for Testing from Child Nodes (kbps)
1543	**65.00%**	1002.95	540.05	200

The next cell to be completed is the only other editable cell in Section A, the **Peak Utilization of the Connection to the ISP**. In this example, the value is 65%. The other cells in Section A are calculated based on the data provided in Section B of the worksheet. Peak utilization data is obtainable through varying resources. One consideration is whether the school division owns the gateway router or if it is owned and maintained by the ISP. It may be necessary to contact the ISP for peak utilization data on the division's leased lines. In addition to obtaining the data from the ISP or by connecting directly to the interface in the router, network utilities exist that may be installed and configured on network devices that will regularly track bandwidth utilization. Such a utility currently in use by various school divisions is called "Multi Router Traffic Grapher" or MRTG. This software is freely available for use under the terms of the GNU General Public License. For additional information on MRTG, go to http://mrtg.hdl.com/mrtg.html.

The graphic below is a partial screen shot from the Bandwidth Estimator worksheet. Section A is shown with the data discussed on the previous page. Section B has also been completed based on the sample data that is provided in the worksheet. In the first column of Section B, **School 1** is entered as being connected directly to the gateway as it is depicted in the network diagram. The data for School 1 has been entered accordingly across that row. It shows that proctor caching is being implemented at the school, that a maximum of 50 computers will be used simultaneously for online testing. Additionally, the bandwidth and peak utilization are entered again for School 1. The status message indicates that sufficient bandwidth exists in this environment to support 50 concurrent online tests being administered. By reviewing the two columns prior to the status message, it is clear that more than enough bandwidth is available (540.4 kbps) to cover the required amount (200 kbps) when proctor caching is in place with 50 computers used for testing simultaneously at School 1 and School 1A.

Section A - Gateway to ISP

Leased Bandwidth to ISP (kbps)	Peak Utilization of Connection to ISP (%)	Peak Utilization of Connection to ISP (kbps)	Effective Available Bandwidth (kbps)	Bandwidth Required for Testing from Child Nodes (kbps)
1543	**65.00%**	1002.95	540.05	200

Proctor Caching is implemented at the gateway level: ☐

Combined Number of Students Contributing to Load For All Schools	100
Maximum # Students Concurrently Testing	270
Bandwidth limitations will accommodate total demand from testing.	

Section B - Schools Connected at Gateway

School	Downstream School	Proctor Caching Implemented at Node	Number of Students Testing Simultaneously for this School	Total Number of Actual Students Testing Simultaneously Through this Node	Bandwidth to Gateway (kbps)	Peak Utilization of Connection to Gateway (%)	Peak Utilization of Connection to Gateway (kbps)	Effective Available Bandwidth (kbps)	Bandwidth Required at Node	Status Message
School 1	-	☑	50	100	1544	65.00%	1003.6	540.4	200	This school is within bandwidth limitations.
School 1A		☑	50	-	512	50.00%	256	256	100	This school is within bandwidth limitations.
		☐		-						
		☐		-						
		☐		-						
		☐		-						

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School 1A is then entered into the worksheet as a "downstream" school because it is connected directly to School 1. In this case, the data shows that proctor caching is also being used at this school and that an additional 50 computers will be used simultaneously for testing resulting in a total of 100 computers testing simultaneously through the node (School 1). This data also shows that School 1A has only a 512kbps line that is connecting it to School 1 and that is operates at 50% peak utilization. Given the use of proctor caching at this school as well, the available bandwidth (256 kbps) is adequate to cover the amount needed for the 50 computers testing simultaneously. All schools listed on the Test Windows Calculations worksheet must be entered into Section B of the Bandwidth Estimator along with the maximum numbers of tests to be administered online simultaneously. To successfully achieve School Readiness Certification, no status indicators should show red.

Signature Page:

The final step in completing the School Readiness Certification document is to print a hard copy of the document and obtain the required signatures on for the Signature Page worksheet. The signed original copy should be mailed to the address provided on the page and an electronic copy of the file should be emailed to the included email address. School divisions are strongly encouraged to keep a copy of the signed, completed document on file along with a file copy of the electronic version. The Virginia Department of Education will respond to the division superintendent to confirm receipt of a successful School Readiness Certification document.

Financial Implications of School Readiness Certification:

Successful completion of the various levels of School Readiness Certification allows for added flexibility in the use of the Web-based SOL Technology Initiative funding originating from the sale of Virginia Public School Authority (VPSA) equipment notes. After School Readiness Certification is successfully completed for a school division's high schools, that division may use its VPSA funds for eligible technology expenditures at its middle schools. After School Readiness Certification is successfully completed for a school division's middle schools, that division may use its VPSA funds for eligible technology expenditures at its elementary schools.

For questions or additional information regarding the School Readiness Certification process, please contact one of the following individuals at the Virginia Department of Education:

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